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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/750,894	01/05/2004	Suk-gyun Han	1293.1805	2081

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EXAMINER

PHAM, HAI CHI

ART UNIT	PAPER NUMBER
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2861

DATE MAILED: 12/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/750,894

Applicant(s)

HAN ET AL.

Examiner

Hai C. Pham

Art Unit

2861

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-46 is/are pending in the application.
- 4a) Of the above claim(s) 14-44 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13,45 and 46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

FINAL REJECTION

Election/Restrictions

1. Applicant's election with traverse of Species I including claims 1-13, 45 and 46 in the reply filed on 04/14/06 is acknowledged. The traversal is on the ground(s) that the examination does not require separate fields of search. This is not found persuasive because the Species define different sensorless control algorithms, which are mutually exclusive from each other. Claim 1 is currently generic to all Species.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3, 5-7, 13 and 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hori (JP 8-211317) in view of Munro et al. (U.S. 6,118,238).

Hori, a prior art provided by Applicants, discloses a laser scanning unit comprising a housing (casing 11), an optical system disposed in *the interior* of the casing (11) and including an optical source (semiconductor laser light source 16) which emits a laser beam, a mirror (polygon mirror 12), which scans the laser beam, and a plurality of optical elements (scanning lenses 14 and 15), which image the laser beam

on an image surface (photoconductor member, not shown), a motor (polygon mirror motor 13) disposed in *the interior* of the casing (11) and which rotates the mirror, and a motor drive chip (IC chip for driving the polygon mirror motor 13) disposed outside of the housing (the circuit board 17 on which the IC chip controlling both the semiconductor laser light source 16 and the polygon motor 13 is mounted, is located on top of the casing exposed to the open air, namely located *outside* of the casing 11). Hori further teaches the motor drive chip is mounted on a main printed circuit board (17) of a printing machine with which the laser scanning unit is used (the circuit board 17 is the main printed circuit board containing the IC chip that controls both the semiconductor laser light source 16 and the polygon motor 13) (see Abstract) (Figs. 1 and 2).

Hori fails to teach the motor drive chip using a sensorless algorithm to control a rotation speed of the motor, the motor being a three-phase brushless DC motor, the sensorless control algorithm uses back-electromotive forces generated by the motor, the back-electromotive force signal lines, the sensorless control algorithm uses a current supplied to the motor.

Munro et al. discloses a motor controlling circuit (850) constructed with an IC chip for driving and controlling a three-phase brushless DC motor, wherein the sensorless control algorithm uses back electromotive forces generated by the brushless DC motor wherein the motor drive chip and the motor are connected by power supply and back-electromotive force signal lines (signal lines 806) (col. 5, lines 24-31) (col. 7, lines 28-39).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the brushless DC motor controlled based on the back electromotive forces to the device of Hori as taught by Munro et al. The motivation for doing so would have been to provide a high-speed starting engine for rotating the polygon mirror to a stable and constant speed.

With regard to claim 3, Hori further teaches the motor drive chip is electrically connected to the motor by a cable (electrical cable 18).

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hori in view of Munro et al., as applied to claims 1, 3 above, and further in view of Choi et al. (KR 2002-0033922).

Hori, as modified by Munro et al., discloses all the basic limitations of the claimed invention except for the cable being a flexible printed circuit board.

Choi et al., a prior art provided by Applicants, discloses an optical scanning device provided with a flexible printed circuit board cable (60) for connecting the main IC chip (500) to the motor (400) of the polygon mirror (300).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide the device of Hori with the flexible printed circuit board cable as taught by Choi et al. for the purpose of providing a flexible electrical connection between the different components of the scanner.

5. Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hori in view of Munro et al., as applied to claims 1, 6 above, and further in view of Carr et al. (U.S. 5,430,362).

Hori in view of Munro et al. further discloses:

- (Munro et al.) the motor drive chip includes a motor starting section which generates a motor starting signal to start the motor (the LPU controller 200 initiates the start phase by sending a signal to the start inverter 80) (col. 5, lines 5-14), an inverter (three-phase inverter 810), which applies current to the motor in response to the motor starting signal (the three-phase converter 810 being used as a current source to the motor), a back-electromotive force detecting section which detects back-electromotive forces generated by rotation of the motor (the back EMF being sensed at the output of the three-phase inverter 810 in a closed loop sequence operation) (col. 7, lines 28-39), and a commutation control section (830) which controls the inverter in response to the speed control signal,
- the inverter is a three-phase inverter having three terminals, three power supply lines connect the three terminals to the motor drive chip, and one electromagnetic force line connects the back-electromagnetic force detecting section to the motor (Fig. 3).

However, Hori in view of Munro et al. fails to teach the speed control section, which detects a position of a rotor of the motor and a speed of the motor based on waveforms of the back-electromotive forces detected by the back-electromotive force

detecting section to generate a speed control signal, and the back-electromotive force detecting section detects waveforms of back-electromotive forces and the back-electromotive forces have respective phase differences of 120 degrees, wherein the speed control section respectively senses zero-crossing points of the waveforms of the back-electromotive forces so as to identify the position of the rotor.

Carr et al. discloses an engine starting system including a position sensor (244) for detecting the rotor position of a brushless DC motor in accordance with the back EMF voltage so as to control the speed of the motor, and the back-electromotive force detecting section detects waveforms of back-electromotive forces and the back-electromotive forces have respective phase differences of 120 degrees (col. 30, lines 1-15) (Fig. 8), the speed control section respectively senses zero-crossing points of the waveforms of the back-electromotive forces so as to identify the position of the rotor (col. 24, lines 42).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to modify the device of Hori (in view of Munro et al.) by providing the speed control based on the detection of the position of the rotor as taught by Carr et al. for the purpose of estimating the position and speed of the rotating motor at the starting period.

Response to Arguments

6. Applicant's arguments filed 09/27/06 have been fully considered but they are not persuasive.

Applicants argued that “because the Hori IC is mounted on the casing, Hori cannot meet at least the aforementioned features of independent claims 1, 45, and 46”, e.g., the “motor drive chip disposed outside of the housing”, and that “Hori actually teaches away from the present invention as recited in claims 1, 45, and 46”. The examiner respectfully disagrees. Hori discloses in Figs. 1 and 2 the IC chip for controlling both the semiconductor laser beam source (16) and the polygon motor (13) is disposed on the main circuit board (17) mounted on top of the casing (11) and facing the *outside* of the housing as opposed to the optical scanning components, e.g., semiconductor laser beam source, polygon mirror and scanning lenses, which are disposed in the *interior* of the casing. In other words, the motor drive chip is actually disposed outside of the housing of the scanning unit. The teaching of Hori therefore fully meets the claimed features of independent claims 1, 45, and 46.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C. Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



HAI PHAM
PRIMARY EXAMINER

December 2, 2006